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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA
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Order Instituting Rulemaking on the Commission's Own Motion into the Service Quality Standards for All Telecommunications Carriers and Revisions to General Order 133-B	)))))	Rulemaking 02-12-004 (Filed December 5, 2002)

DECLARATION OF DR. DEBRA J. ARON
SUPPORTING OPENING COMMENTS OF VERIZON CALIFORNIA INC. AND ITS CERTIFICATED CALIFORNIA AFFILIATES

May 14, 2007

Pursuant to the March 30, 2007 Assigned Commissioner's Ruling and Scoping Memo, Verizon California Inc., on behalf of itself and its certificated California affiliates (collectively "Verizon"), submits this declaration of Debra J. Aron in support of its Opening Comments.

I, Debra J. Aron, declare:

I. Qualifications

1. My name is Debra J. Aron. I am the Director of the Evanston offices of LECG, LLC, and Adjunct Associate Professor at Northwestern University. My business address is 1603 Orrington Avenue, Suite 1500, Evanston, IL, 60201. LECG is an economics and finance consulting firm that provides economic expertise for litigation, regulatory proceedings, and business strategy. Our firm comprises more than 250 experts from academe and business, and has 28 offices in North America, Europe, Asia Pacific, and Latin America.

2. I received a Ph.D. in economics from the University of Chicago in 1985. Prior to joining LECG, I was an Assistant Professor of Managerial Economics and Decision Sciences from 1985 to 1992, at the J. L. Kellogg Graduate School of Management, Northwestern University, and a Visiting Assistant Professor of Managerial Economics and Decision Sciences at the Kellogg School from 1993-1995. My research focuses on multi-product firms, innovation, incentives, and pricing, and I have published articles on these subjects in several leading academic journals, including the *American Economic Review*, the *RAND Journal of Economics*, and the *Journal of Law, Economics, and Organization*. I currently teach a graduate course in the economics and strategy of communications industries at Northwestern University. I have consulted and testified on numerous

occasions to the communications industry and state and federal regulators on competition, costing, pricing, and regulation issues in the U.S. and internationally. My professional qualifications are detailed in my curriculum vitae, which is submitted as Attachment DJA-1.

II. Background and Purpose of Proceeding

3. This proceeding was originally opened in 2002.[1] On March 30, 2007, the Commission issued a ruling revising the scope of this proceeding. The Commission explained that, in light of its URF Phase 1 decision, the existing service quality regulation must change,[2] and identified two objectives of service quality regulation consistent with current regulatory policy in California. The Commission explained that:

> Service quality regulation should aim to 1) rely on competition, wherever possible, to promote broad consumer interests and 2) promote development of a wide variety of new technologies and services in a competitively and technologically neutral manner.[3]

4. In light of the Commission's findings in its URF Phase 1 decision and its revised objectives for service quality regulation, the purpose of this proceeding is to determine "what service quality data and reports are needed…so that the

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1 Order Instituting Rulemaking, *Order Instituting Rulemaking on the Commission's Own Motion into the Service Quality Standards for All Telecommunications Carriers and Revisions to General Order 133-B*, Before the Public Utilities Commission of the State of California, Docket No. R. 02-12-004, December 16, 2002.

2 Assigned Commissioner's Ruling and Scoping Memo, *Order Instituting Rulemaking on the Commission's Own Motion into the Service Quality Standards for All Telecommunications Carriers and Revisions to General Order 133-B*, Before the Public Utilities Commission of the State of California, Docket No. R. 02-12-004, March 30, 2007, (hereafter *Scoping Memo 3/30/07),* pp. 3-4.

3 *Scoping Memo 3/30/07*, p. 3.

Commission can assess whether the competitive market adequately protects California consumers."[4]

5. The Commission is of the preliminary opinion that collecting and publishing the results of a survey of California consumers will achieve this purpose. According to the Commission:

> Of the performance indicators analyzed, the indicator that could be adapted to both wireline and wireless services most easily is the customer satisfaction surveys, which measure satisfaction with installations, repairs and answering time. Customer satisfaction has the advantage of being easily understood by consumers and could be published on the Commission's website to permit comparison of satisfaction before the customer chooses and/or changes carriers. Publishing the results of customer satisfaction surveys would promote customer education and would not be designed to trigger investigations and resulting penalties. The Commission, with parties' input, would need to ensure that the survey follows professional norms and transmits data to the Commission staff in usable formats.[5]

6. I have been asked by Verizon to offer an economic opinion on the role of service quality regulation and reporting in a competitive market in light of the Commission's obligations under California law, and on the questions posed by the Commission in the scoping memo regarding service quality reporting.[6]

III. The Commission's Fundamental Goal is to Ensure That Customers Have Safe, Reliable Service

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[4] *Scoping Memo 3/30/07*, p. 3.

[5] *Scoping Memo 3/30/07*, p. 4.

[6] My discussion in this declaration pertains to service quality standards and monitoring issues as applied to retail communications services only. I do not consider in this declaration the implications of service quality standards and monitoring as applied to wholesale communications services.

7. My analysis and conclusions are informed by the policy objectives established for the Commission. The Commission's service quality objectives are set forth in Public Utilities Code, §709(h) and §2896(c). The pertinent subsections of the code are as follows:

> § 709(h):
> [The Commission is] [t]o encourage fair treatment of consumers through provision of sufficient information for making informed choices, establishment of reasonable service quality standards, and establishment of processes for equitable resolution of billing and service problems."
>
> § 2896(c):
> [The Commission is to ensure] [r]easonable statewide service quality standards, including, but not limited to, standards regarding network technical quality, customer service, installation, repair, and billing.

8. Both provisions share the common requirement that the Commission establish "reasonable" service quality standards.

9. The Commission's purpose is further illuminated by the language in its mission statement, and articulated in the Governor's proposed 2007 budget. These state that the regulators' "fundamental objective" is "to ensure that customers have safe, reliable utility service."

10. By focusing on safety and reliability, the Governor's articulation of the Commission's fundamental objective is, I believe, consistent with the economic analysis I will provide in this declaration and with the position of Verizon that current carrier reporting requirements pertaining to quality of service should be discontinued, while leaving reporting requirements pertaining to safety or safety-related reliability such as network outages unaffected. It is also consistent with the Commission's determination quoted above that service quality regulation should rely on competition wherever possible to promote consumer welfare. Insofar as the "service quality" standards of relevance in this proceeding pertain

to aspects of communications services such as installation, maintenance, and customer service, I will explain that economic principles dictate and experience in other industries demonstrate that competition promotes welfare-enhancing service quality. Consumer welfare is best advanced in a competitive market by permitting the market, rather than regulators, to determine "reasonable" service quality standards. The Commission's resources are better spent monitoring safety-related concerns than monitoring service quality, which can be adequately and effectively monitored by the competitive market.

IV. Summary of Conclusions

11. In light of the Commission's findings in its URF Phase 1 decision, and the Commission's policy objectives and obligations under California law, my main conclusions in this declaration are as follows.

12. The market mechanism in competitive markets is generally superior to regulation to determine and provide an array of service quality options that consumers value. Superimposing regulation of service quality on providers in a competitive marketplace will inevitably stifle the array of options available to consumers, to their detriment, and distort the allocation of firms' resources among service quality characteristics away from characteristics that consumers most value.

13. The fact that competition in the communications marketplace today is largely intermodal and involves several markedly different technologies renders any attempt to regulate or even monitor service quality even more problematic because the factors that could be objectively monitored are often incomparable across technologies, and also because the Commission lacks jurisdiction over some competitors. In light of the potential harms to consumers, as well as the practical impediments to regulatory-imposed service quality standards in a competitive marketplace with intermodal competition, the Commission can best

meet its obligation to ensure reasonable service quality standards by permitting the market, rather than regulators, to determine service quality.

14. Even simple monitoring of service quality is not entirely benign. One potentially harmful effect of monitoring service quality is that it may distort carriers' incentives to provide an efficient mix of service quality. Monitoring focuses a spotlight on certain (regulator-determined) service characteristics measured in a certain (regulator-determined) way. Whatever dimensions the regulator chooses to monitor, carriers will distort their allocation of resources toward excelling in those dimensions, even if they are not the mix or level of service quality that customers particularly value.

15. In addition, monitoring service quality risks violating the principle of competitive neutrality because the Commission's lack of universal jurisdiction over all competitors in the marketplace renders it impossible for any carrier reporting requirements to be uniformly applied. Hence, carrier data on service quality collected by the Commission would not only offer an incomplete picture of the industry and marketplace, but they would impose costs of compliance on some competitors and not on others, which in itself fails competitive neutrality.

16. There is no reason to believe that the array of information available to the Commission and consumers from third-party sources, consumers, and FCC reports is insufficient for the Commission to be aware of concerns regarding service quality that may arise in the market, nor is there any reason to believe that third party sources are insufficient to adequately inform consumers. Hence, eliminating carrier reporting requirements on service quality measures, such as the G.O. 133(b) and Merger Compliance Oversight Team ("MCOT") reports, while retaining reporting on safety-related issues, is consistent with the Commission's finding that the market is competitive and with its obligations to the citizens of California.

17. Consumer surveys of service quality, while having the ability to overcome some of the limitations inherent in carrier reporting on quality metrics, nevertheless have significant limitations of their own that pertain to the problems of attempting to infer consumer welfare from quality assessments. Economic principles and actual experience in our economy tell us that service quality is an invalid indicator of consumer welfare. For example, the introduction of lower quality options in a market, *accompanied by more than proportionately lower prices*, increases consumer welfare despite decreasing the average service quality. Hence, surveys that elicit information about perceived service quality, even if highly accurate, provide no inference about consumer welfare and, therefore, have limited or no public policy implications. For the Commission to justify the expense associated with conducting such surveys it would have to demonstrate what the anticipated benefits would be, and that the anticipated benefits and uses of the results would outweigh the costs, taking into consideration the significant amount of information already available and surveys already conducted in the market.

18. My declaration is organized as follows: In Section V, I explain that competition is an effective regulator of service quality, and that the Commission can rely on competition to achieve reasonable quality standards for the dimensions of service quality at issue in this proceeding. I also provide a number of examples of how competition has produced greater diversity of service quality offerings and higher levels of service quality in other industries. In Section VI, I describe how even simple monitoring of service quality is not benign and may have unintended consequences that diminish consumer welfare. In Section VII, I describe the need to consider carefully the benefits and the costs of adopting any service quality monitoring requirements. Finally, I explain the limitations of conducting survey research on service quality for public policy applications. If the Commission decides it is necessary to conduct a consumer survey, careful consideration must be taken with regard to the survey's design, and the interpretation of the survey's results.

V. For the Aspects of Service Quality at Issue in this Proceeding, the Commission Can Rely on the Competitive Market to Produce Reasonable Quality Standards

A. The Theoretical Justification for Service Quality Regulation That Existed Under NRF Does Not Exist in a Competitive Marketplace With Unregulated Prices.

19. Under price cap regulation and lack of competition, regulated companies have an incentive to minimize costs and produce efficiently, but not necessarily to produce the optimal level of service quality.[7] Hence, when companies were regulated under the New Regulatory Framework ("NRF"), particularly when and for those services that faced little or no competition, one could not necessarily rely on the companies' private incentives to produce efficient service quality. As competition developed, the incentives to produce efficient levels of service quality—those that met consumer preferences—became more powerful; but even then, price ceilings and floors would be expected to interfere with optimal provision of quality because a regulatory regime in which prices are capped and subject to a price floor would not be expected necessarily to fully replicate the incentives of a competitive market for service quality. A price-cap-regulated company in a competitive market would be forced by competition to offer the best level of quality that is consistent with its price; but it may not offer an optimal combination of price and quality because of its inability to fully adjust price. For example, customers who might prefer a higher-quality, higher-price service would not be offered such a service by the incumbent if the incumbent were not permitted to increase price to a level that made the higher quality financially viable. Similarly, as I will discuss later, when airlines were subject to regulatory price floors, consumers may have preferred lower-priced services with fewer

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[7] See, for example, David E. M. Sappington, "Regulating Service Quality: A Survey," *Journal of Regulatory Economics* 27, no. 2 (2005), pp. 123-154; and David E. M. Sappington, "The Effects of

amenities, but carriers could not offer such service profiles due to the price floors. Only after price restrictions were lifted did a fuller array of price-quality combinations come to the market, to the significant benefit of consumers.

20. The incentive for a company in an unregulated competitive market to increase quality is two-fold. In an unregulated market, if consumers place a positive value on the increased quality, then increasing quality both increases the amount of the service that the firm can sell at a given price, and increases the price that the company can charge. If the value consumers place on the increased quality exceeds the cost to the provider of offering it, the increased quality will increase not only consumer welfare, but will be profitable to provide. The ability to offer combinations of quality and price without regulatory constraints permits companies to seek to offer portfolios of service characteristics that best meet consumer demands, at prices that are disciplined by competition. If any firm were to charge excessively for higher quality, competitors could match the higher quality while undercutting the other firm's price. If a firm were to offer insufficient quality for the price charged, a competitor could offer the same quality at a lower price or a higher quality for the same price.

21. Hence, in competitive markets, competition can generally be relied upon to elicit an efficient array of service quality options more effectively than can regulation. A fundamental question before the Commission in this proceeding, then, is what the proper role of the Commission is in carrying out its obligations in a competitive environment, especially one with the special challenges created by competition in which the characteristics of the different competing technologies necessarily render them incomparable on many dimensions. The Commission's objectives to rely on competition where possible, and to promote innovation and

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Incentive Regulation on Retail Telephone Service Quality in the United States," *Review of Network Economics* 2, issue 4 (December 2003), pp. 355-375.

technological development, must be harmonized with the law's requirement that the Commission establish reasonable service quality standards. The meaning of this requirement is illuminated in the Commission's mission statement that the Commission must ensure that customers have safe, reliable phone service.

22. The Commission's (and Governor's) focus on safety and reliability is useful and instructive guidance. Economic research suggests that where issues of public safety are involved, there may be extraordinary factors affecting the functioning of the market that require additional analysis to assess what, if anything, would be the role of a regulator in advancing social welfare. Research has found that where consumer decisions involve assessing the likelihood of events that have very small probabilities of occurring, individuals tend to have a poor ability to make accurate assessments and rational decisions. For example, studies find that research subjects systematically tend to underestimate the probability of being diagnosed with cancer and overestimate the probability of being killed by a tornado.[8] When the potential outcome of very low-probability events is likely to be life-threatening or catastrophic if it occurs, the systematic unreliability of consumers to have rational expectations about those possibilities may impede the normal functioning of the market to produce socially optimal outcomes.[9] Such situations do not necessarily imply that regulation is superior to the market for producing efficient levels of safety, or that regulation can overcome the problems associated with decision making about very small probability events with life-

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[8] W. Kip Viscusi, John M. Vernon, and Joseph E. Harrington, Jr., ECONOMICS OF REGULATION AND ANTITRUST, 2nd ed., (Cambridge, MA: MIT Press, 1997), Figure 19-2 (hereafter *Viscusi et al. 1997*), p. 662.

[9] This is not to say that economists assume or require that consumers are generally individually rational, and that individual rationality is a necessary condition for adequate functioning of the market. They do not. The functioning of competitive markets, even when individuals are demonstrably irrational, tends to be robust to individual irrationality and tends to produce efficient outcomes in aggregate. However, where the consequences of bounded rationality are likely to be severe and irreparable, there may be less public policy tolerance for the trial-and-error nature of the market and more tolerance for sacrificing optimal safety on average in exchange for ensuring minimal safety always.

threatening consequences any better than can the market; but rather that additional analysis would be necessary before determining whether and in what cases the public interest is best served by relying on competition to produce an adequate level of safety where small probability events with large negative consequences are involved.

23. The dimensions of service quality at issue in this proceeding and listed in Exhibit A to the March 30, 2007 Scoping Memo do not generally fall into the category of service characteristics that would raise the concerns just described. The aspects of service quality that are at issue in this proceeding may affect consumer well-being and consumer satisfaction with the service, but do not significantly involve issues of safety. As I understand this proceeding, it is not intended to address monitoring requirements associated with safety, and those reporting requirements are anticipated to remain in place. The public interest is served by leaving the market to best determine service quality options available to consumers on dimensions of quality that do not involve significant safety issues, and to leave to a separate analysis the monitoring of those aspects of services that involve safety. In what follows I will be addressing only the former and not the latter.

B. Optimal Service Quality is Determined by Consumer Preferences, Not Technical Standards

24. The regulatory process is fundamentally unsuited for determining optimal levels of service quality. The process of identifying socially efficient and welfare-maximizing levels of service quality is not a mechanical or formulaic process, but rather requires iteration and interaction with consumers, because socially optimal levels of quality depend on consumer preferences and perceptions of quality, as well as on costs and technology. The socially optimal level of quality is not perfect quality, even if that were attainable, because the higher the quality, the higher the cost of providing it. A level of quality is optimal for a given consumer if the incremental value provided to the consumer from that level of quality just

merits the incremental cost of providing it. That is, optimal service quality for a given individual consumer is a balance of value and cost.

25. Moreover, there is generally no single level of optimal service quality economy-wide because different people have different preferences and therefore different optimal levels of quality. In a market, there will generally be different levels of quality supplied at different prices to meet different demands. For instance, Internet access is offered today at various speeds (from dial-up to broadband), over a variety of different platforms (from fixed wireless, to mobile wireless, to cable and "traditional" landline), all at different prices. In the airline industry there are different classes of service (coach, business, first) offered at different prices. And in the auto industry there are different car types (luxury, sport, efficiency) offered at different prices. It is socially desirable that this diversity of offerings exist. Customers would be worse off if all Internet access were dial-up or all DS-1 broadband (with the associated costs), or all airplane seats were first class or all coach, or all cars were luxury or all efficiency sedans.

26. Indeed, even referring to an optimal "level" of service quality is misleading insofar as it implies that quality is one-dimensional and can, therefore, only be "higher" or "lower." In fact, within a single type of service and technology, quality typically has multiple dimensions. For an automobile, for example, the "quality" would include the gas mileage, the probability of a breakdown, the beauty of the design, the durability of the finish, the quietness of the ride, the elegance of the interior finishes, the responsiveness of the steering and acceleration in an emergency, the power of the engine, and on and on. To say that one car has "higher" quality than another is often meaningless because, for example, one consumer may place high value on the power of the engine and another may place high value on gas mileage; these consumers may have opposite perceptions of quality for the same automobiles, and both would be "right" because in markets, consumer preferences are sovereign.

27. When competition is not only intramodal but is intermodal, the ability to compare "quality" across technologies is even further diminished, because some dimensions of quality in one technology may not even apply to another technology. For example, there are dimensions of service quality relevant to wireline services that are not relevant to wireless services. For one, customers cannot meaningfully compare installation times across services—wireless service is not "installed" in a customer's premise, as is typically the case for wireline service. Other comparisons may be possible to conduct but be misleading. For example, it might be misleading to compare certain network reliability measures, such as the percent of dropped calls, across traditional wireline and wireless services. One can, of course, construct such a comparison, but the comparison illuminates the problem with the exercise to begin with: wireless would have a significantly higher percentage of dropped calls due to the nature of the technology, but it would be very harmful to consumers for policymakers to try to require wireless services, which are based on rapidly evolving and improving technologies, to have the same level of dropped calls as traditional wireline service. To satisfy such a mandate, wireless carriers would incur substantial costs, which would require them to either increase the price of their services or sacrifice features or service quality in other dimensions that consumers value, or both. The harm to consumer welfare would be substantial.

28. Competition acts to provide consumers the combinations of price and service quality they demand. Consumers reveal their preferences by selecting the combination of price and quality that best meets their individual needs, and suppliers respond by tailoring their service offerings to best accommodate consumers' preferences. This includes the opportunity for consumers to select among different technologies that have different price/quality attributes. Where suppliers compete to provide customers the portfolios of quality they demand, consumers' welfare is increased because each consumer is provided the quality attributes that better matches his preferences. The diversity of consumer preferences, and the ability of suppliers to accommodate these preferences, is

evidenced in the profusion of different price/quality communications service combinations available today, and the diversity of attributes of different technologies that compete with each other.

29. Permitting a variety of price/quality options to emerge in the market not only directly advances consumer welfare, but it advances the competitive process itself. Offering a different price/quality combination or simply a different combination of quality attributes at prices comparable to those of competitors are ways that providers differentiate themselves from each other to compete and generate competitive advantages. For instance, T-Mobile has announced it will launch its "Hotspots at Home" service this summer, which provides cell phones that can roam on Wi-Fi hotspots in order to improve indoor reception and help customers conserve their monthly plan minutes.[10] Verizon Wireless, by comparison, has expressed reservations about the reliability of the service because, it is reported, "the carrier isn't convinced that Wi-Fi technology, which operates on unlicensed frequencies…is high enough quality to carry the carrier's voice calls."[11] A new venture named Sonopia Corp. is reselling wireless services to organizations such as the National Wildlife Foundation ("NWF"), which in turn is selling the service to wildlife enthusiasts and activists. It is reported that Sonopia's services, such as those provided to NWF, are targeted specifically to serving niche consumer demand:

> The [NWF] group's phones feature ringtones that croak like frogs and chirp like birds, provide updates on environmental news and, someday, will allow users to call their congressman at the touch of a button…

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[10] Amol Sharma, "How Wi-Fi Can Extend T-Mobile's Range," *Wall Street Journal*, p. B3, May 3, 2007 (hereafter *Sharma 5/3/07*).

[11] *Sharma 5/3/07*.

> NWF Mobile is one of a host of new mobile services targeting micro-markets, tiny niches that no cellphone giant would have the time or expertise to penetrate.[12]

30. Another example is AT&T (Cingular), which markets its network coverage by providing an interactive mapping feature on its Web site, enabling customers to check the quality of network coverage where they live and work before they purchase service.[13] In yet another example of diversification through quality investment, in the 1980s, Sprint was the first long-distance carrier in the U.S. to roll out a nationwide, all-digital, fiber-optic network and, as a result, initiated the now-(in)famous "pin drop" commercials to highlight the call clarity of its service.[14] As these many examples demonstrate, if all companies had to meet the same quality standards they would have diminished incentive to creatively seek ways to better serve customers through more tailored offerings.

31. Not only is competition sufficient to ensure reasonable standards for service quality, but imposing service quality regulations in a competitive market can be harmful to consumers. Competition transpires in ways that are often difficult for the regulator or anyone to anticipate. As explained by economist and former chairman of the Civil Aeronautics Board, Alfred Kahn:

> [T]he essence of the case for competition is the impossibility of predicting most of its consequences. The superiority of the competitive market over governmental determinations is the positive stimuli it provides for constantly improving efficiency, innovating, and offering consumers diversity of choices. It is precisely because neither the government nor industry planners are capable of envisioning the ideal potential performance of an

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12 *Sharma 5/3/07*.

13 "Cingular Coverage Viewer," www.cingular.com/coverageviewer/ (accessed May 10, 2007). A similar feature is also provided by T-Mobile. See, "T-Mobile Coverage: Personal Coverage Check," http://coverage.t-mobile.com/default.aspx (accessed May 10, 2007).

14 Sprint Nextel, "Milestone Events Making Sprint History," www.sprint.com/companyinfo/history/ (accessed May 8, 2007).

> industry—how its costs will behave, what innovations it may make, what choices it will offer consumers—that we prefer, as a general public policy, to leave those determinations to the forces of a competitive market.[15]

32. All quality choices have an associated cost and therefore involve a tradeoff. For example, one area of service quality is customer care, which includes the information services a company provides its customers (or potential customers) intended to address product-related questions. Customer care services can be provided by telephone using a computer (an "automated-response" system) or a human (a "live-response" system); or by the Internet using information stored on the company's website, an email exchange, or instant messaging ("IM"). As should be apparent, there is significant variation in the "quality" of customer care services across these different customer care systems, as well as the cost of supplying them. The preferred system or mix of systems will depend on a multitude of factors, such as the type or mix of customers served by a company (e.g., customers across demographics may have different needs and preferences, as will business and residential customers), the type or mix of services provided by a company (e.g., the care needs of data services customers may differ from customers taking voice services or bundled services), or the "mode" (technology) employed by a company to provide services (e.g., the care needs of VoIP customers may differ from those of wireless customers or traditional wireline customers) and, of course, the relative costs of the different options.

33. Regulators do not have the constant feedback from the marketplace that providers do, and therefore cannot know which dimensions of service quality are most important to consumers or most valued relative to their costs, and so are likely to impose requirements emphasizing quality attributes that do not necessarily

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[15] Alfred E. Kahn, "Deregulation and Vested Interests: The Case of Airlines," in *The Political Economy of Deregulation*, eds. Roger G. Noll and Bruce M. Owen , (Washington D.C.: American Enterprise Institute, 1983), p. 140.

correlate with customer preferences. A consequence of wrongly specified standards is that they will force service providers to divert resources from providing service attributes that customers care about to providing the attributes regulators care about.[16] Regulators cannot establish standards that replicate the array of different price/quality combinations that arise in a market, and so will limit the offerings and deprive customers of valuable choice. As Professor Kahn described in his classic treatise, *The Economics of Regulation*:

> Service standards are often much more difficult to specify by the promulgation of rules. Where they can be specified, they are often essentially uncontroversial. Where they cannot—and this is particularly the case when it comes to innovations, to the dynamic improvements of service—in a system in which the private companies do the managing and the government the supervision, there is no choice but to leave the initiative with the company itself. The only role the regulatory commission can typically play is a negative one.[17]

34. Compounding this problem is the fact that, even if the Commission were able to overcome the difficulties of establishing accurate service quality standards appropriate for today's services, this is no guarantee that the standards will be appropriate or relevant to the services available in the future. In a dynamic, rapidly evolving industry such as communications, service quality regulations must not only reflect current conditions but also be compatible with and effective in the business and technological environment that will exist in the coming years. These challenges are profound, as are the consequences of establishing inappropriate service quality standards.

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[16] Bengt Holmstrom and Paul Milgrom, "Aggregation and Linearity in the Provision of Intertemporal Incentives," *Econometrica* 55, no. 2 (March 1987), pp. 303-328.

[17] Alfred Kahn, *The Economics of Regulation*, Volume I "Economic Principles," (New York: John Wiley & Sons, 1988), p. 22.

C. Competition and Consumer Choice Drive Service Quality in Many Industries

35. The power of competition and consumer choice in driving service quality and producing a distribution of different types of service quality to match consumer demand is demonstrated in a variety of industries, and is documented in case studies and the economics literature.

1. Competition improved quality in the U.S. automobile industry

36. One industry in which the effect of competition on quality is apparent is the U.S. automobile industry. The automobile industry shares many economic characteristics with the communications industry. Both are characterized by large fixed costs, brand name recognition, installed facilities, and specific technical expertise. In addition, automobile consumers, like communications consumers, have a number of sources of information, about a wide variety of quality attributes, price and performance. Well known organizations such as Kelley Blue Book and Consumer Reports have provided reports on automobile quality since the 1920s and 1930s, respectively.[18]

37. Historically, the U.S. automobile industry was dominated by the "Big 3" manufacturers (General Motors, Daimler Chrysler, and Ford), with non-"Big 3" providers (which, at the time, were often foreign manufacturers) constituting less

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[18] "The History of Kelley Blue Book," www.kbb.com/kbb/CompanyInfo/History.aspx (accessed May 8, 2007); and "About Us: Our history," Consumer Reports, www.consumerreports.org/cro/aboutus/history/printable/ index.htm (accessed May 8, 2007). Other popular sources of automobile quality information include J.D. Power and Associates, and Edumnds.com, which began publishing automobile quality reports in the 1980s and 1990s, respectively. See, "About the Firm," www.jdpa.com/corporate/about/overview/ (accessed May 9, 2007); and "Edmunds Automotive Network: About Us," www.edmunds.com/help/about/ (accessed May 7, 2007).

than a 10 percent share of the U.S. market until the 1960s.[19] Today, however, there are twelve auto manufacturers challenging the Big 3. Collectively, these challengers now supply 45 percent of all automobiles purchased in this country.[20] Their success was based on, among other things, the ability of these manufacturers to serve a need that the Big 3 manufacturers had apparently not been filling. The upstart manufacturers successfully entered the U.S. market by offering consumers reliable, low priced cars, with good gas mileage.[21] The impact of this growing competition from Japanese imports on domestic automobile quality is clearly described in an industry study by economists Mark Nichols and Gary Fournier as follows:

> In 1980, the Big Three averaged 740 defects per 100 vehicles assembled, whereas Japanese imports averaged 205. The cost to Chrysler of such defects was $274 per car. By 1989, however, substantial effort to revive production techniques, labor relations, and parts procurement had been made. The result was a 78% reduction in the number of defects, to 161 per 100 vehicles. The Japanese also made quality improvements over this period with the number of defects falling 42%, to 119 per 100 vehicles. In 1993, the gap continued to narrow with 119 and 94 defects per 100 for the Big Three and the Japanese respectively. The end result of the new competition, cost reductions, and incorporation of Japanese management techniques into domestic production was a substantial improvement in quality relative to the beginning of the 1980's. There is a growing consensus that the gap between domestic and

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19 Automotive News: *Market Data Book 1985*, p. 26, quoted in Robert C. Feenstra, "Transportation Economics: A Look at the Auto Industry," ECN 145, Lecture 6, Department of Economics –University of California, Davis www.econ.ucdavis.edu/faculty/fzfeens/trans/Transport-lecture6.pdf (accessed May 11, 2007).

20 Automotive News reports a total of 5,227,790 U.S. sales in 2007 through April, of which 2,347,394 were sales of non-"Big 3" providers. "Data Center U.S. Sales Table," www.autonews.com/ apps/pbcs.dll/misc?url=/misc/salestable.html (accessed May 9, 2007).

21 Craig Freedman, "Arigato - An Economic History of the Japanese Import Invasion into the US," School of Economic and Financial Studies, Macquarie University, Australia, October 1998.

> Asian models has narrowed considerably. Furthermore, many predict this to narrow further over the next decade.[22]

38. Research on the automobile industry demonstrates that auto service quality, as measured in product defects, has improved significantly over time and that these improvements to service quality were a consequence of increased competition from imported automobiles during the study period.

2. Competition, spurred by industry deregulation, improved the array of quality offerings and increased consumer welfare in the U.S. airline industry

39. The airline industry is also instructive, particularly insofar as the airline industry and communications industry share some similarities with regard to their histories as regulated industries. While communications is now in the process of liberalization and deregulation—a process that commenced just over a decade ago—the airline industry eliminated economic regulation almost 25 years ago. The market response to deregulation and its effect on service quality in the airline industry may offer insight into how deregulated competition will impact service quality in the communications industry.

40. The airline industry began a process of phased economic deregulation following implementation of the Airline Deregulation Act in 1978. That Act ordered the

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[22] Mark W. Nichols, and Gary M. Fournier, "Recovering from a bad reputation: changing beliefs about the quality of U.S. autos," *International Journal of Industrial Organization* 17 (1999), p. 301. These findings are consistent with a number of other studies on the auto industry during this period. For instance, Consumer Reports found in 1991 that: "During the [preceding 10 years], American cars have improved so much that Detroit can now justly claim that its products are about as reliable on average as Hondas and other Japanese cars were when their stellar reputation was being formed … American cars have become much more reliable … [and] are catching up to Japanese cars … Cars in general are getting better." See, "Is Detroit Closing the Reliability Gap?" *Consumer Reports* (April 1991), pp. 248-249. Economists Dardis and Soberon-Ferrer conclude in a 1994 study that "Imports of Japanese cars have provided increased choice for American consumers and have placed increased pressure on the U.S. automobile industry to improve product quality." See, Rachel Dardis and Horacio Soberon-Ferrer, "Consumer Preferences for Japanese Automobiles," *Journal of Consumer Affairs* 28, no. 1, (1994), pp. 126-127.

federal agency regulating airlines, the Civil Aeronautics Board ("CAB"), to terminate its regulation of routes by the end of 1981, and its regulation of prices by the end of 1982.[23] Up until the industry was deregulated, the CAB exerted near-complete control over the market structure of airline services. The CAB controlled prices charged by all airlines, entry of new airlines, and the ability of existing airlines to expand (to serve new routes), contract (to abandon existing routes), and exit (cease operations).

41. It is generally recognized by economists that the effect of regulation in the airline industry was to limit price competition (thereby holding prices above a competitive level). Being unable to compete by decreasing price, airlines competed by offering increased quality of service. This led to excessive levels of quality in the form of amenities, and a wide array of flights with low load factors (the capacity utilization of an airplane, measured as the number of passengers on the airplane divided by the number of seats). The quality levels were excessive in the sense that economic theory predicts that consumers would have been better off with the option of lower prices and fewer amenities, an option that was precluded by the regulatory restrictions on price and entry.

42. The predictions of economic theory were borne out by experience. The abolition of economic regulation provided increased price competition for airline services, which has driven innovation and an increased array of service quality options. The changes to service quality have, as expected, included decreases in amenities and other quality attributes (and increases in others). However, the net effect of these changes—namely, the substantial decline in prices, leading to greater demand, leading to increased quality through flight frequencies (which increases passengers' convenience of scheduling), have together more than offset the other

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[23] *Viscusi et al. 1997,* p. 576.

quality declines—and provided a substantial increase to overall consumer welfare. While these results may surprise some—whose perceptions may be that airline service quality has declined over the past several years—measured objectively, since the CAB ceased regulating prices and entry in the industry, the *value* to consumers of airline services, considering both price and quality, and the demand for airline services, have increased dramatically.

43. The success of Southwest Airlines is one example of how competition following deregulation affected service quality. Southwest Airlines led a revolution in the industry not by providing higher quality service such as better meals, more rapid check-in, and a more extensive network, but by concentrating on *lower price* at some expense to convenience and comfort, i.e., no meals and no assigned seating. Despite the lower convenience and comfort of its service, Southwest's consumer satisfaction scores are consistently high.[24] In fact, Southwest currently has the highest consumer satisfaction scores in the industry.[25]

44. In addition to the anticipated effects of deregulation on service quality, deregulation also prompted unanticipated innovations that led both to greater efficiency and greater service quality. Since being deregulated, the airline industry has undergone, and continues to undergo, substantial innovation. By removing restrictions on entry into different routes, deregulation permitted carriers to develop efficiencies in designing their route structures. One of the most noticeable changes was the accelerated development of the hub-and-spoke system,[26] which dramatically increased flight frequency, and provided customers

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[24] The American Customer Satisfaction Index, "Scores by Industry: Airlines," www.theacsi.org/index.php?option=com_content&task=view&id=147&Itemid=155&i=Airlines (accessed May 9, 2007) (hereafter *ACSI—Airlines)*.

[25] *ACSI—Airlines*.

[26] Economists Steven Morrison and Clifford Winston explain that before deregulation most major airlines employed some type of hub-and-spoke system. However, it was the increased freedom and flexibility post-deregulation that "substantially accelerated their use." See, Steven Morrison and Clifford

greater diversity of departure times. The hub-and-spoke system also greatly increased the efficiency of airline service, allowing carriers to not only increase flight frequency, but also improve load factors.[27] The accelerated development of the hub-and-spoke system was an unanticipated outcome of deregulation. The centrality of this post-deregulation industry innovation to producing substantial welfare benefits highlights an important lesson; namely, that it is difficult to predict what innovations competition will produce.[28]

45. As the success of Southwest indicates, the nature of competition following deregulation did not lead to unambiguous increases to all dimensions of service quality, but instead provided consumers a wider variety of services, greater frequency of flight options, and lower average prices. A study by economists Steven Morrison and Clifford Winston estimate the aggregate consumer welfare gains and losses following deregulation across a variety of different service quality dimensions.[29] The authors find that for some measures of service quality, such as travel restrictions, travel time, number of connections, and load factor, consumer welfare declined, on the order of $8 billion. These decreases to service quality, however, were more than offset by improvements to other service characteristics, such as travel frequency and mix of connections, which the authors' estimate increased consumer welfare by $11.1 billion. Including consumer welfare gains from reduced prices of $12.4 billion, the overall net consumer welfare gains were quite impressive, on the order of $15 billion.

Winston, THE ECONOMIC EFFECTS OF AIRLINE DEREGULATION, (Washington, D.C.: The Brookings Institution, 1986) (hereafter *Clifford and Winston 1986*), p. 8.

27 *Viscusi et al. 1997,* p. 584.

28 See, for example, Clifford Winston, "Economic Deregulation: Days of Reckoning for Microeconomists," *Journal of Economic Literature*. 31, no. 3 (Sept 1993), pp. 1263-1289, who explains that *even economists* failed to predict precisely the economic effects of deregulation.

29 Steven Morrison and Clifford Winston, THE EVOLUTION OF THE AIRLINE INDUSTRY, (Washington, D.C.: The Brookings Institution, 1994).

46. Several studies have investigated the effects of deregulation on airline safety, and find no deterioration in safety following deregulation.[30] Furthermore, economist Nancy Rose uncovers an interesting inter-modal effect of deregulation on safety. As I mentioned before, following deregulation prices fell and flight frequency increased significantly. According to Professor Rose, these changes acted to increase the volume of commuter airline traffic, at the expense of automobile traffic, and that this substitution effect improved overall traveler safety by replacing riskier private auto travel with lower-risk air travel. Professor Rose concludes that:

> Even with conservative estimates of the extent of modal shift and highway fatality rates, the overall number of lives saved by switching travel to the air is substantial: on the order of 90 to 140 or more lives per year.[31]

47. These findings demonstrate that deregulation of prices that regulators had kept artificially high led to significant benefits to consumers through expanding the offerings of price and service quality to levels that better suited customer preferences. And these improvements were driven by the increased competition among airlines. Furthermore, the research demonstrates that in some safety-specific dimensions of service quality, improvements were made following deregulation (as measured in increased substitution of auto transport for airline transport), and these improvements were driven not by changes to safety standards, but by the increased competition among airlines.

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[30] See, for example, Nancy L. Rose, "Fear of Flying? Economic Analysis of Airline Safety," *Journal of Economic Perspectives*, 6, no. 2 (Spring 1992) (hereafter *Rose 1992*), pp. 75-94, who examines a number of different measures of safety (including fatalities, accidents, and incidents) and finds that regardless of the measure considered, the conclusion is the same: the long-term improvements to airline safety—a trend which commenced prior to deregulation—has continued following deregulation. Steven A. Morrison and Clifford Winston, "Air Safety, Deregulation, and Public Policy," *Brookings Review* (Winter 1988), pp. 10-15, examine safety from a different perspective, by comparing aviation insurance rates pre- and post-deregulation, and find that rates did not increase following deregulation.

[31] *Rose 1992*, p. 82.

48. The pressure in the airline industry to offer additional options that were lower on the quality spectrum (along with lower prices) was the result of the lifting of regulatory restrictions that prevented prices from falling. If restrictions are lifted that have prevented prices from rising, there would be increased opportunities to offer higher-quality services in tandem with higher prices. Both effects enhance consumer welfare because, in competitive markets, they are driven by consumer preferences.

3. Competition and technology innovation improved quality of mobile wireless services

49. The communications industry itself contains a number of prime examples of the proposition that competition drives and facilitates quality improvements. Consider wireless services. In 1994, states were preempted by federal law from imposing rate regulation on mobile wireless services,[32] which price deregulated wireless services in California (one of the states that imposed price regulations on wireless up until that year).[33] In the following year the FCC commenced auctioning of PCS wireless spectrum, concluded the auctions in 1995, and PCS networks were up and running in 1996. Up until that point, the mobile wireless industry was largely constrained by spectrum limitations to two providers. By 1999, just three years after the first commercial launch of a PCS system in the U.S., approximately 75 percent of the U.S. population could choose from at least 3 wireless service providers.[34] One year later, by 2000, 88 percent of the U.S.

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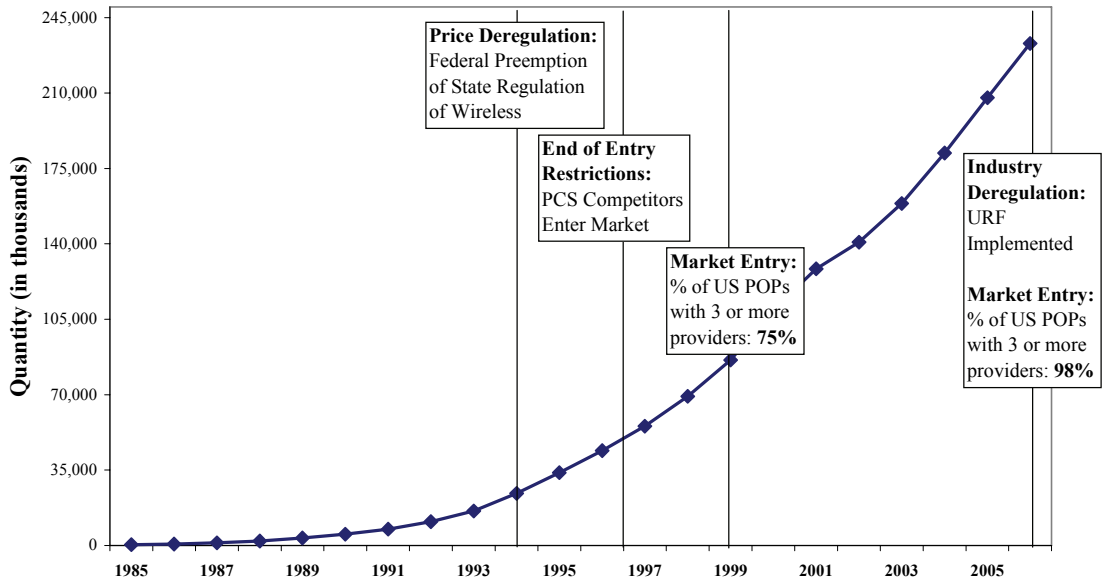
[32] Omnibus Reconciliation Budget Act of 1993 (codified in relevant part at 47 U.S.C. §332 (c)(3), which pre-empted state regulation of mobile wireless prices and entry as of Sept. 1, 1994.

[33] Thomas W. Hazlett, "Regulating Wireless Phones in California: An Economic Analysis," White Paper, presented at the Pacific Research Institute Conference "Regulating Wireless in California," dated April 9, 2003, www.pacificresearch.org/events/2003/wireless/HazlettPaper.pdf (accessed May 8, 2007).

[34] Fourth Report, *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993* and *Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Before the Federal Communications Commission, WT Docket No. 06-17, FCC 99-136, released June 24, 1999, Appendix C, Table 7.

population could choose from 3 or more wireless providers, and by 2006, the figure increased to 98 percent of the U.S. population.[35] See Figure 1.

Figure 1:
Nationwide Mobile Wireless Subscription



*All observations are as of year end.
Source: Wireless Subscribers--See, CTIA. Semi-Annual Wireless Industry Survey.

50. The impact of growing wireless competition on prices and consumer demand has been dramatic. According to the FCC and the Cellular Telecommunications & Internet Association ("CTIA"), between 1993 and 1998 average monthly usage per user remained relatively constant; subscribers used on average 140 minutes per month in 1993 and 136 minutes per month in 1998.[36] In contrast, by year-end 2000, subscriber usage had increased to an average of 255 minutes per month, and

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[35] Eleventh Report, *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993* and *Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Before the Federal Communications Commission, WT Docket No. 06-17, FCC 06-142, released September 29, 2006 (hereafter *FCC Eleventh Wireless Report*), Appendix A, Table 11.

[36] *FCC Eleventh Wireless Report*, Appendix A, Table 10.

by year-end 2005, average subscriber usage had increased further to 740 minutes per month (an increase of over 400 percent from 1998 levels).[37] Likewise, the price of mobile wireless services declined significantly during that time frame. For instance, in spite of this fivefold increased usage, and despite prices being unregulated, the average monthly bill for mobile wireless service declined from $61.49 in 1993 to $49.98 in 2005.[38]

51. The effects of competition are also reflected in service innovations and quality improvements. As providers deployed their digital networks, they introduced innovative services (see, for example, the introduction of phones with cameras and MP3 players, and Web browsing),[39] and innovative price structures (see, for example, AT&T's decision to offer a national, one-rate pricing plan).[40] Moreover, with the advent and explosive growth of digital service came offerings of a myriad of advanced features, such as enhanced forms of caller ID and call management functionality, which typically come standard in today's wireless service plans. According to a recent survey by Forrester Research, today almost half of all wireless subscribers avail themselves of the non-voice wireless

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37 *FCC Eleventh Wireless Report,* Appendix A, Table 10.

38 The average price per minute of mobile wireless service over this time frame fell by 85 percent, from $0.44/minute in 1993 ($61.49 ÷ 140 minutes) to $0.07/minute in 2005 ($49.98 ÷ 740 minutes). See, *FCC Eleventh Wireless Report,* Appendix A, Table 10.

39 T-Mobile offers a wireless handset called the "Sidekick 3," which the carrier markets as "your social lifeline." Features included in the Sidekick 3 are web browsing, a camera phone, an MP3 player, text, email, IM, and a variety of vertical features, www.t-mobile.com (accessed May 12, 2007).

40 AT&T Wireless introduced its "Digital One-Rate" plan in 1998. It provided customers with a single, block price for all calls, any time of day, anywhere in the US, with no separate long distance or roaming charges. The Digital One-Rate plan has been widely imitated and all distance plans are the norm today. Malcolm E. Spicer, "AT&T launches first national one-rate wireless plan," *Mobile Phone News*, May 11, 1998, findarticles.com/p/articles/mi_m3457/is_n19_v16/ai_20766102 (accessed May 11, 2007).

services, such as text messaging, mobile Internet access, and downloading games and ringtones.[41]

52. According to the J.D. Power and Associates' 2007 Wireless Call Quality Performance Study, released March 15, 2007, mobile wireless call quality continues to increase. The overall rate of customers experiencing a wireless call quality problem has declined in three consecutive surveys, with reported problems per 100 calls reaching the lowest level since J.D. Power performed this study for the first time in 2002.[42] According to Kirk Parsons, the senior director of wireless services at J.D. Power and Associates:

> Wireless providers have clearly made great strides in improving call quality. With an increasingly competitive environment and an increase in the number of services used in conjunction with a cell phone, carriers that offer superior network quality are more likely to attract new customers and increase customer retention. In fact, improving network quality is a beneficial financial incentive for wireless carriers, as customers experiencing at least one call quality problem are almost four times more likely to definitely switch carriers in the future.[43]

4. Competition and technology innovation improved quality of broadband Internet access services

53. Broadband Internet access also has an impressive history of competition driving consumer welfare benefits via reduced prices and increased service quality. It was not until 1994 when Netscape introduced its web browser that broad commercial use of the Internet, via the Worldwide Web, took hold. And it was

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41 Phyllis Korkki, "Keypad Economics: Why Talk When You Can Type?" *New York Times*, May 6, 2007.

42 J. D. Power and Associates Reports, "Wireless Call Quality Problems Continue to Decline as the Transition to 3G Networks Takes Hold," J. D. Power and Associates Press Release, March 15, 2007 (hereafter *J. D. Power 3/15/07*).

43 *J. D. Power 3/15/07.*

not until several years later, between 1996 and 1998, that cable modem and DSL broadband services were introduced on a mass-market basis.[44] From the time of the initial rollout of cable modem broadband service in San Francisco in 1996, household adoption of broadband surpassed 5 percent nationwide in only four years.[45] In contrast, it took the refrigerator and the television 10 years to reach this threshold, and the personal computer took 8 years to penetrate 5 percent of U.S. households.[46] A driving force behind this rapid adoption, as my own research has demonstrated, was competition between providers of DSL and cable modem services,[47] and as a result of this competition consumers have experienced substantial increases in the quality of service and decreases in price.

54. Six years ago, for example, a 1.5 Mbps DSL service from Verizon and SBC was priced at $80 and $65 per month, respectively, and installation and equipment costs ranged from $249 to $400.[48] Today, Verizon and SBC offer the same services without installation and equipment charges, at $35 per month and $20 per month, respectively.[49] Overall, across all broadband services, analysts have found that average broadband revenue per subscriber has declined—and are predicted to continue declining. At the same time, the FCC has determined that the average

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44 The Cable Center, *Cable History: Timeline*; and Jeff Pelline, "DSL: New kid on the block," *CNET News.com*, November 20, 1997 at http://news.com.com/2009-1023-205586.html?tag=rn (accessed January 20, 2003).

45 James Penhume and Michael Goodman, "Residential Broadband Reaches Critical Mass," The Yankee Group, January 18, 2000, pp. 10, 19.

46 Christophe Van den Bulte, "New Product Diffusion Acceleration: Measurement and Analysis," *Marketing Science* 19, no. 4 (Fall 2000), p. 374.

47 David E. Burnstein and Debra J. Aron, "Broadband Adoption in the United States: An Empirical Analysis," in DOWN TO THE WIRE: STUDIES IN THE DIFFUSION AND REGULATION OF TELECOMMUNICATIONS TECHNOLOGIES, ed. Allan L. Shampine, (New York: Nova Science Publishers, 2003), pp. 119-138.

48 Ernie Bergstrom, "U.S. Residential DSL Market Continues to Grow," Cahners In-Stat Group Analyst Report, October 2001.

49 Verizon Communications, "Verizon Broadband Services: Great News! Verizon High Speed Internet without local service is available for your home," www22.verizon.com (accessed May 3, 2007). AT&T, "DSL Residential Service—AT&T Yahoo! High Speed Internet," www.att.com/gen/general?pid=6431 (accessed May 3, 2007).

quality of service (as measured in the speed or bandwidth of the service) has increased.[50]

D. Consistent with California and Federal Law, the Commission Can Rely on Competition to Determine Reasonable Standards for, and Achieve Socially Efficient Combinations of, Price and Service Quality

55. In its URF Phase 1 decision, the Commission provided a detailed discussion of its statutory policy objectives (as set forth in §709 of the California Public Utilities Code), and the manner in which it is legally obligated to pursue these objectives.[51] Citing to the Public Utilities Code (§ 709.5), the Commission concluded that California law "endorses a reliance on competitive markets to achieve these goals." The Commission further opined that:

> Consistent with the Legislature's intent, the Commission, whenever possible, has relied on competition as a means to ensure that rates are "just and reasonable." For example, in reviewing whether to grant AT&T pricing flexibility for long distance services, the Commission concluded that "competition from the other [long-distance carriers] should ensure reasonable prices in these markets. If AT&T-C prices its services too high or if its service quality deteriorates, customers will have the incentive to switch to a lower priced or better-quality carrier."

56. Just as the Commission determined that market conditions allow the Commission to rely more heavily on competitive forces to produce "just and reasonable" rates for the state's telephone customers, these same market forces can also be relied

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[50] "High-Speed Services for Internet Access: Status as of June 30, 2006," Federal Communications Commission Industry Analysis and Technology Division, Wireline Competition Bureau, January 2007, Tables 1, 2, and 5. "High-Speed Services for Internet Access: Status as of December 31, 2004," Federal Communications Commission Industry Analysis and Technology Division, Wireline Competition Bureau, July 2005.

[51] Opinion, *Order Instituting Rulemaking on the Commission's own Motion to Assess and Revise the Regulation of Telecommunications Utilities*, Before the Public Utilities Commission of the State of California, Decision 06-08-030, August 24, 2006, (hereafter *D.06-08-030*), pp. 31-36.

upon to produce "just and reasonable" service quality. Relying on competition satisfies the Commission's obligation to establish reasonable service quality standards, as all of the examples of other industries demonstrate. When competition is effective, as the Commission has found to be the case in California, competition is superior to regulation in achieving a socially optimal array of service quality offerings.

VI. Monitoring Service Quality Can Have Unintended Consequences That are Harmful to Consumers

57. Thus far my discussion has focused on the effects of imposing service quality regulations and standards. However, even simple monitoring of service quality is not entirely benign.

58. One potentially harmful effect of monitoring service quality is that it may distort service providers' incentives to provide an efficient mix of service quality. Whatever dimensions the regulator chooses to monitor, carriers will focus their resources on excelling in those dimensions, even if they are not the mix or level of service quality that are of primary importance to customers. For instance, building upon the customer care example discussed earlier, if the Commission focuses on measuring the number of seconds it takes the customer service department to answer the phone, carriers may meet that need by employing a machine to answer phones. This will satisfy the desire to have faster service, but customers may prefer an alternative in which they wait longer but speak to a person right away. In response or to avoid this result, the Commission may define "answer time" as the time it takes for the caller to speak to a person. The carrier's rational and necessary response to this may be to hire more agents to answer the phone, but spend less on training each agent that would enable him or her to solve a variety of problems without transferring the customer to someone else. As a result, the customer may have her call answered more quickly, but have her call

transferred more often. Companies do not have unlimited resources, and any decision (or requirement) to spend more money in one area is likely to require economizing in some other area. Whether customers prefer to have their call answered more quickly, or less quickly but by a better-trained agent who is more likely to be able to solve their problem, is a trade-off that companies will determine based on their own consumer research and feedback, and that companies may use as an avenue to differentiate themselves from competitors. Monitoring reports that emphasize and publicize the time-to-answer will tend to distort carrier's resources in that direction, potentially to the detriment of customers.

59. In the airline industry, for example, one area of airline service quality that draws significant attention is airline flight delays. On-time performance measures are collected by Department of Transportation Statistics to monitor flight delays and are an apt example of how collecting data on performance can distort market conduct. The incentive to maintain or improve on-time performance as measured by the Department of Transportation has, in some instances, caused carriers to increase the scheduled duration of flights, a practice known in the industry as "padding." The benefits of padding are said to be significant:

> By lengthening the "block times" in their flight schedules, airlines not only reduce passenger squawks [complaints] about late flights but also look better in the Transportation Department's monthly reports measuring their percentage of on-time arrivals. A No. 1 ranking can be the centerpiece of an advertising campaign, but a last-place finish can be damaging.[52]

60. One reason a carrier might engage in padding has to do with what is monitored by regulators—and more specifically, what is *not* monitored. One measure of

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[52] Greg Gordon, "Airlines building delays into schedules," *Star-Tribune (Minneapolis and St. Paul, MN)*, May 20, 2001.

performance that is not monitored, and for which there is little data, is flight delay caused by early arrival of a "padded" flight. This effect is explained as follows:

> Paradoxically, the problems [caused by early arrivals] stem in large measure from the airlines' efforts to improve their on-time records…
>
> So when everything goes right with a flight, the odds of an early arrival are much higher than in the past, especially on longer flights, where even a small push in speed from a tail wind can add up over several hours in the air.
>
> With airlines using computer models to squeeze more efficiency from their operations, if a plane arrives early, more often than not its assigned gate is still occupied by another jet.[53]

61. The on-time performance of airline service is clearly an important dimension of service quality to consumers. However, as this example demonstrates, regulator-mandated monitoring may not provide an effective means of improving the reliability of airline service. In fact, the empirical literature has found that on-time performance *does* improve where airlines face increased competition.[54] Therefore, permitting firms to compete, instead of imposing regulator mandated monitoring, may provide a more effective means of achieving high levels of on-time performance.

62. One of the fundamental reasons that monitoring service quality is inherently difficult pertains to the multi-dimensional nature of quality that I discussed earlier. In a competitive market, one service provider may focus on improving service quality in one dimension—for instance, in T-Mobile's case, by offering cell phones that roam on Wi-Fi hotspots in order to improve the quality of indoor

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[53] "Early Flights Bother Travelers," *New York Times*, January 7, 2001.

[54] Michael J. Mazzeo, "Competition and Service Quality in the U.S. Airline Industry," *Review of Industrial Organization* 22, no. 4 (June 2003), pp. 275-296; and Nicholas G. Rupp, Doug Owens, and

reception—and advertise its performance on this dimension of quality. In contrast, another service provider may choose instead to focus its resources on improving another dimension of service quality—for instance, in Verizon's case, by investing in improvements to geographic coverage and service reliability—and advertise its performance on these dimensions of quality. This diversity of competitive offerings creates obstacles to defining quality metrics that reflect the meaningful dimensions of quality and that are comparable across firms. Nevertheless, consumers benefit from this diversity of offerings resulting from the competitive interplay of firms seeking to increase their performance and focusing their resources on the areas where they have a competitive advantage to provide what they think customers want.

63. All of these considerations regarding the difficulty of devising quality "metrics" against which to require reporting are exacerbated in an inter-modal market. For example, as I mentioned before, service installation metrics may be relevant to VoIP and traditional wireline services customers, but are likely not relevant to wireless customers, since wireless services are not "installed" in a customer's premise, as are typically wireline services.

64. The market addresses the lack of comparability problem by creating a market for information. Where information is valuable, there is an incentive for third parties to assemble and provide it. Diversity of complicated services may suggest a need for information to be provided to consumers, but it does not indicate that regulators need to be the ones to provide that information. Research, analysis, and provision of information is a valuable economic activity provided by a number of businesses. As I have mentioned before, third parties like Consumer Reports, J.D. Power, TNS Telecom, Jupiter Research, IDC, eMarketer, Yankee

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L. Wayne Plumly, "Does Competition Influence Airline On-Time Performance," East Caroline University, Department of Economics Working Paper, December 12, 2001.

Group, In-Stat, ACSI, and others collect and disseminate consumer survey data on the service quality of communications services. These third-party reports are used in different ways to inform end-use customers. Some reports, such as those provided by Consumer Reports, are marketed to and purchased directly by end-use consumers. Other companies provide their reports to media outlets who, in turn, report the survey findings on TV, on the radio, over the Internet, or in newspaper and magazine articles. In some instances, the companies' reports are provided to service providers who wish to identify consumer perceptions of their services relative to competitors' services, or for use in marketing the quality of their service to end-users.

65. Of course, service quality monitoring conducted by third parties also would be expected to alter the behavior of the companies being monitored, a part of the interactive nature of markets that discipline providers. If Consumer Reports finds that one service provider is significantly worse on some aspect of service quality than its competitors, that service provider is likely to devote resources to improving in that area, especially if it believes that consumers agree with Consumer Reports that the particular aspect of quality is important. In a market, different information sources will emphasize different aspects of quality, and providers will respond to them in aggregate and to their own direct communications with customers depending on their own individual assessment of what is important to consumers.

66. To the extent that monitoring of service quality by the Commission takes the form of reports provided to the regulator by carriers (rather than, say, consumer surveys), such monitoring risks violating the principle of competitive neutrality. The Commission does not have jurisdiction over all companies that compete in the relevant marketplace. The Commission recognized this fact in its Phase 1 decision when it noted, "It currently is not possible for the Commission to adopt a completely uniform regulatory framework that applies to all communications

carriers, because the Commission does not have jurisdiction over all communications service providers."[55]

67. There are both direct and indirect effects of carrier reporting that would render it non-competitively-neutral. First, it is apparent that imposing monitoring requirements on only a subset of competitors is not competitively neutral because it is costly for carriers to comply with these requirements. If compliance costs are imposed on a subset of competitors and do not apply equally to all competitors, competition is distorted in favor of those service providers who escape the costs of reporting requirements and against those who must report. This asymmetric burden is a direct, competitively biased effect of carrier reporting requirements. And, since the Commission does not have jurisdiction over all competitors, it is apparent that requiring such monitoring reports of some would not be consistent with its goal of competitive neutrality.

68. In addition, because of the competitiveness and diversity of the communications industry in California, were the Commission to make policy decisions on the basis of the monitoring reports of only those carriers under its jurisdiction, it could do significant harm to competition. To the extent that monitoring reports on service quality metrics carry an implicit threat of regulation, that regulation could be imposed only on the service providers under its jurisdiction, and not on those who do not report. Therefore, imposing reporting requirements on some competitors and not others would asymmetrically distort the behavior of the reporting companies, and again argues against imposing such reporting requirements on any carriers. The problem of non-universal information is inherent in monitoring, and must be taken into account if considering monitoring as the basis for regulation.

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[55] *D.06-08-030*, p. 261 and 273 (indicating different levels of jurisdiction over different voice service providers).

69. The Commission's G.O. 133(b) and MCOT reports are an example of carrier-specific, non-competitively-neutral service quality monitoring. I understand the G.O. 133(b) requirements are imposed on ILECs, CLECs, and Inter-exchange Carriers only, and not VoIP or mobile wireless providers. The MCOT requirements are imposed on AT&T and Verizon only. The G.O. 133(b) and MCOT reporting requirements collect a variety of performance measures, such as installation intervals, maintenance, dropped calls, and customer service answer times. In light of the extent of competition for communications services in California, as documented in the Commission's URF Phase 1 decision, maintaining the G.O. 133(b) and MCOT reporting requirements would likely suffer all of the defects I described in this section and risk distorting competition, to the detriment of consumer welfare.

VII. The Potential Benefits of Any Service Quality Monitoring Must Justify the Cost, in Light of Already-Existing Information Available to the Commission and the Public

70. I have explained that, focusing attention on the dimensions of service quality at issue in this proceeding, the competitive market is best suited to engender reasonable performance on quality of service, and that even monitoring of service quality, while seemingly benign, can have adverse effects. The Commission's lack of universal jurisdiction over all relevant competitors undermines the ability of the monitoring process to be competitively neutral, and reporting metrics inevitably shine a government-sponsored light on certain quality attributes and not others, potentially distorting investments in quality.

71. In light of the competitiveness of the marketplace today, and the market for information that exists in the marketplace today, it is appropriate for the Commission to rely on the marketplace to provide optimal service quality and there is no apparent value added by the Commission engaging in monitoring of service quality. If the Commission's intent were to use the information to

regulate the marketplace, doing so would distort incentives and impede the efficient functioning of the marketplace, to the detriment of consumers, for all of the reasons I have discussed. If the Commission's intent were to collect the information in order only to enhance public information, there is no a priori reason to believe that there is any market failure that would lead to inadequate provision of information about service quality from the private sector. The Commission should expend resources to engage in monitoring only where the benefits of doing so outweigh the costs.

72. Information gathering should be done only where there is evidence that the market would not provide adequate information and consumers would suffer as a result of the information failure. Monitoring should be conducted only insofar as the benefits are clear, the use of the information is well defined in advance, and the benefits exceed the costs. When assessing the benefits, they must be understood to be incremental to the benefits already provided by the information, research, and reports that are already available to the Commission and consumers.

73. In fact, significant amounts of information are already provided or available to the Commission. These include the following:

- As I have discussed, a large volume of consumer satisfaction surveys are administered and provided by third-party, privately funded companies such as Consumer Reports, J.D. Power, TNS Telecom, Jupiter Research, IDC, eMarketer, Yankee Group, In-Stat, ACSI, and others, which investigate the service quality of various communications services at regular intervals over time.

- Consumer complaint data are collected by the Commission to facilitate resolution of billing and service problems. I understand the Commission is now looking at ways to improve the process of collecting and resolving

consumer complaints. Depending on how the Commission modifies this process, these data may serve as valuable information regarding consumer perceptions of service quality in the marketplace.

74. In addition to the information available on service quality, information on safety-related concerns such as network outages from all wireline and wireless providers is collected by the FCC. The network outage information reported by price cap ILECs under the FCC's jurisdiction are summarized in ARMIS report 43-05. The Commission also collects network outage information from California ILECs, CLECs and IXCs. I understanding Verizon has no plans to discontinue reporting information on network outages to the FCC or the Commission.

75. The information available to customers to evaluate the relative quality of service provided by companies in the marketplace is not limited to the formal surveys and other information I have discussed. As in any industry, customers learn about service quality and attributes from a variety of sources, and the information available to customers about products has expanded tremendously with the availability of the World Wide Web. In fact, there are now web sites that are devoted to customer experiences with communications services where consumers share their opinions and experiences regarding specific service providers and locations of service. For example, there is a website, www.cellreception.com, that permits users to search by ZIP code and read or post comments from other users about cell phone reception in their neighborhood or at a specific location or intersection. Entering the San Francisco ZIP code 94131, I found 42 pages of entries by users (not all in the 94131 ZIP code, although these were listed first), describing the coverage they receive from a specific (named) service provider at a specific place. If there is a business opportunity for someone to provide information that customers value, it is likely to be provided. The Internet has only enhanced these opportunities for the market to work.

76. In light of the information on service quality already available and the concerns about carrier reporting I have discussed, it is neither necessary nor consistent with the Commission's policy goals to require carrier reporting of service quality measures. As I have already explained, any effort to collect data from carriers will necessarily make a value judgment about what measures are important, will violate competitive neutrality, will face impediments to comparability across technologies due to intermodal competition, and will distort carriers' behavior with respect to those measures.

77. While consumer survey research can overcome some of the inherent flaws of carrier monitoring, survey research *on service quality* also has significant limitations that undermine its potential value to the Commission. Survey research is an attractive means, and perhaps the only means, of acquiring competitively neutral and technology-neutral data on objective statistics such as telephone penetration and service availability. One cannot attempt to quantify overall telephone penetration, for example, without acquiring comparable data about the penetration of all technologies and providers; and such information can be acquired by asking customers an objective question (albeit, a clear, methodologically correct, well-worded one). However, and in contrast, the economic principles I have discussed illuminate a fundamental problem with survey research on customers' perception of service quality. The problem is a consequence of the fact that consumer welfare derives from the price-quality *combination*, not from quality alone. If service A has a high price and high quality and service B has lower price and lower quality, consumer welfare may be higher from B than A. This would be the case if consumers considered the relative quality of B a better value for the price than that of A. Moreover, suppose that only option A were offered in a regulated market, and deregulation opened the door for B (again, think of B as Southwest Airlines). Having B in the market with A would decrease average quality in the market, but the increased diversity of offerings would increase consumer welfare by creating more options for consumers that some may value. This increased diversity of offerings may well

be reflected in consumer surveys as an average decline in satisfaction with service quality—because average service quality in the market did decline when B was introduced—and yet welfare went up for all consumers by virtue of having an additional choice. This phenomenon of consumer welfare increasing as lower price-quality options are introduced was documented in the discussion of the airline industry I provided earlier. Although many airline amenities declined after deregulation, consumer welfare increased, due to lower prices and higher flight frequency.

78. This example illustrates the point that if one were to ask airline consumers whether their service quality went up or down after deregulation, many or all may reasonably say it went down—and yet that would not be and accurate predicator of consumer welfare because research on consumers' own behavior demonstrated that the associated decline in price and increase in frequency more that made up for the loss of amenities. More generally, it is a fundamental implication of economic principles that one cannot assess consumer welfare derived from a service by assessing consumers' valuation of service quality alone. Assessing consumer welfare requires incorporating into the analysis the tradeoffs in consumers' minds between price and quality.

79. Another misgiving that can limit the utility of customer opinion surveys for monitoring service quality, unlike their use for monitoring objective factors such as penetration, is that they are a function of consumer perceptions, which are frequently subjective and change over time for reasons unrelated to the underlying performance or quality of the service. For example, with developing technologies, as consumers become more comfortable with the technology and service and as less sophisticated customers subscribe, their expectations and desire for additional functionality may grow, resulting in less measured

satisfaction with existing levels of quality. The result may be a perception of lower quality when actual quality has remained unchanged or increased.[56] Hence, when attempting to measure a purely subjective attribute such as consumer satisfaction, it is necessary to recognize that changing expectations may make results difficult to interpret and problematic to compare across technologies.

80. It may be possible that survey research could capture all of these factors through carefully designed questions about a consumer's overall satisfaction taking both price and quality into account. If, however, the research indicated declining customer satisfaction with service quality, the policy implications would be unclear because of the fundamental distinction between welfare and quality that I have discussed, and the unavoidable uncertainty about whether the research was actually reflecting the price-quality tradeoff that it was intended to capture.

81. The role of regulators is to implement policy that enhances consumer welfare, and therefore it is ultimately consumer welfare, not quality (or price) per se, that is of interest to policy makers. The difficulty in drawing any inferences about welfare or policy from opinion research on service quality calls into question the policy validity of expending Commission resources to conduct it.

82. Certainly, at a minimum, for there to be value in the Commission conducting any sort of customer surveys on service quality the surveys must follow careful research protocol to ensure that the results are statistically valid, and the results must be interpreted with respect for the nuances and limitations of opinion research on service quality that I have discussed. They should be used for informational purposes only, not for punitive or regulatory purposes, and they

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[56] See, for example, Sidney S. Gorham, President, Telephia, Inc. "Letter to the Wall Street Journal," Press Release, June 1, 2005, www.telephia.com/html/news_press_060105.html (accessed May 11, 2007).

should follow rigorous methodological standards for opinion research. A poorly conducted survey sponsored by the Commission would be very damaging if it created false or biased perceptions of service quality or overall consumer welfare, particularly because it would carry the imprimatur of the Commission. Because research is costly, and the value of the results uncertain, it should be conducted only if the anticipated benefits are well-defined and outweigh the costs.

I declare under penalty of perjury under the laws of the state of California that the foregoing is true.

Executed in Evanston, Illinois on May 14, 2007.

/s/Debra J. Aron

Debra J. Aron

Attachment DJA 1

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EDUCATION

Ph.D., Economics, UNIVERSITY OF CHICAGO, Chicago, IL, 1985

A.B. (summa cum laude), Economics, UNIVERSITY OF CALIFORNIA AT LOS ANGELES, Los Angeles, CA, 1979

PRESENT POSITIONS

LECG, LLC Evanston, IL, 1995-present
Director

Office Director, LECG Evanston

NORTHWESTERN UNIVERSITY, Communication Systems Strategy and Management Program, School of Communication, Evanston, IL, 2000 - present
Adjunct Associate Professor of Communication Studies

ACADEMIC AND PROFESSIONAL EXPERIENCE

NORTHWESTERN UNIVERSITY, J. L. Kellogg Graduate School of Management, Evanston, IL, 1985–1995
Visiting Assistant Professor of Managerial Economics, 1993-1995
Assistant Professor of Managerial Economics, 1985-1992

HOOVER INSTITUTION, 1992-1993
National Fellow

UNIVERSITY OF CHICAGO, Department of Economics, Chicago, IL, 1983–1984
Instructor

CIVIL AERONAUTICS BOARD, Office of Economic Analysis, Washington, DC, Summers, 1979 and 1980
Staff Economist

HONORS & AWARDS

Guthman Research Chair, Kellogg Graduate School of Management, Northwestern University, Summer 1994.

Hoover National Fellowship, Hoover Institution, 1992-1993.

Faculty Research Fellow, National Bureau of Economic Research, 1987-1990.

Pepsico Research Chair, Northwestern University, 1990.

Kellogg Research Professorship, Northwestern University, 1989.

National Science Foundation Research Grant, 1987-1988.

Buchanan Chair, Kellogg Graduate School of Management, Northwestern University, 1987-1988.

IBM Chair, Kellogg Graduate School of Management, Northwestern University, 1986-1987.

RESEARCH INTERESTS

Industrial organization, antitrust economics, business strategy, pricing, information industries, network industries, telecommunications policy, theory of the firm, compensation and incentives.

TEACHING

Courses taught: Pricing Strategy; Information, Communication, and Competition (strategy and competition in communications industries); Intermediate Microeconomic Theory; Managerial Economics (microeconomic theory as applied to business strategy and decision making) at the M.B.A. level, The Economics of Information at the Ph.D. level.

Also qualified to teach: graduate Microeconomic Theory; Industrial Organization and Labor Economics; the Economics of Personnel; Public Finance; Applied Game Theory.

PUBLICATIONS AND WORKING PAPERS

Contributing author, *ABA Section of Antitrust Law, Telecom Antitrust Handbook, (2005)*, (Chicago: American Bar Association), 2005.

"The Proper Treatment of Spare Network Capacity in Regulatory Cost Models," with Ana Danies, May 2005.

"State Commissions Systematically Have Set UNE Prices Below Their Actual Costs," with Frank Pampush and E. Gerry Keith, 2004.

"Broadband Adoption in the United States: An Empirical Analysis," with David E. Burnstein, in *Down to the Wire: Studies in the Diffusion and Regulation of Telecommunications Technologies,* Allan Shampine, ed., (Nova Science Publishers, Hauppauge, NY, 2003).

"Developments in the Theory of Vertical Foreclosure as Applied to Regulated Telecommunications Markets" (March, 2002), Prepared for Presentation at The American Bar Association Section of Antitrust Law, 50th Annual Spring Meeting.

"Modifications at HHIs for Vertical Supply Relationships" with Wenqing Li and James Langenfeld, White Paper submitted to European Commission, February 2000.

"Economic Theories of Tying and Foreclosure Applied—And Not Applied—in *Microsoft,*" with Steven S. Wildman, *Antitrust*, vol. 14, no. 1, 1999, pp.48-52.

"Effecting a Price Squeeze Through Bundled Pricing," with Steven S. Wildman, in *Competition, Regulation, and Convergence: Current Trends in Telecommunications Policy Research*, Gillett and Vogelsang, eds. (New Jersey: Lawrence Erlbaum Associates, Inc.) 1999, pp. 1-17.

"Worldwide Wait? How the Telecom Act's Unbundling Requirements Slow the Development of the Network Infrastructure," with Ken Dunmore and Frank Pampush, *Industrial and Corporate Change*," vol.7, no. 4, 1998, pp. 615-621.

"The Pricing of Customer Access in Telecommunications," with Steven S. Wildman, *Industrial and Corporate Change*, vol. 5, no. 4, 1996, pp. 1029-1047.

"Bonus and Penalty Schemes as Equilibrium Incentive Devices, With Application to Manufacturing Systems," with Pau Olivella, *Journal of Law, Economics, and Organization*, 10, Spring 1994, pp. 1-34.

"Diversification as a Strategic Preemptive Weapon," *Journal of Economics and Management Strategy*, 2, Spring 1993, pp. 41-70.

"Using the Capital Market as a Monitor: Corporate Spin-offs in an Agency Framework," *RAND Journal of Economics*, 22, Winter 1991, pp. 505-518.

"Firm Organization and the Economic Approach to Personnel Management, *American Economic Review*, vol. 80, no. 2, May 1990, pp. 23-27.

"The Introduction of New Products," with Edward P. Lazear, *American Economic Review*, vol. 80, no. 2, May 1990, pp. 421-426.

"Ability, Moral Hazard, Firm Size, and Diversification," *RAND Journal of Economics*, 19, Spring 1988, pp. 72-87.

"Worker Reputation and Productivity Incentives," *Journal of Labor Economics*, vol. 5, no. 4, October 1987, part 2, pp. S87-S106.

"The Role of Managerial Ability and Moral Hazard in the Determination of Firm Size, Growth and Diversification," Ph.D. Dissertation, University of Chicago, August 1985.

REPRESENTATIVE PRESENTATIONS

Presentations to the New Jersey Board of Public Utilities and to the New Jersey Legislature's Telecommunications Utilities Committee regarding the economic principles for a forward-looking regulatory agenda in light of the facts of competition nationwide and in New Jersey, and the costs of regulation, October – November 2006.

"The Interaction of Regulation with Economics and Financial Analysis in Litigation, Policy, and Strategy Consulting," CLE course, XPRT Forum, October 7, 2006.

"Comments on 'Economic Analysis in FCC Merger Proceedings,'" Conference on Economic Analysis and FCC Decisionmaking, presented by the Federal Communications Bar Association (FCBA) and Stanford Institute for Economic Policy Research (SIEPR), Washington D.C., March 15, 2006.

"Economic Principles for Consumer Protection Rules," Pr*i* Telecom / Tech Briefing, Santa Clara, California, October 11, 2005.

"The Proper Treatment of Spare Network Capacity in Regulatory Cost Models," Presentation at the Advanced Workshop in Regulation and Competition, Center for Research in Regulated Industries, Skytop, Pennsylvania, May 2005.

"Telecommunications Regulation: What's Obsolete? What Will Become Obsolete?" Presentation at the State and City Telecom Reform Conference, Heartland Institute, Chicago, Illinois, December 2004.

"Trends in Telecommunications Demand & Supply," Presentation at the 46th Annual NARUC Regulatory Studies Program, Michigan State University, August 2004.

"The Economic Costs of Proposed Wireless Regulations in California," Presentation to Commissioners Brown and Kennedy, California Public Utilities Commission, San Francisco, California, April 2004.

"The Economics of UNE Pricing: Presentation to Staff," Ex parte presentation to the staff of the FCC, in FCC WC Docket No. 03-173: Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, March 2004.

"The High Cost of Proposed New Wireless Regulations," Presentation to the Pacific Research Institute conference "Regulating Wireless in California: Bill of Rights... or Wrongs?," San Francisco, April 2003.

"The TELRIC Showdown," Panelist, NARUC Staff Subcommittee on Telecommunications, 2002 Annual Convention, Chicago, Illinois, November 2002.

"Economic Principles for Efficient Pricing of Municipal Rights-of-Way," National Association of Telecommunications Officers and Advisors (NATOA), Chicago, Illinois, September 2002.

"Trends in Voice and Broadband Competition in Telecommunications Markets: Markets, Strategies, and Regulation," 82nd Annual Convention of the Indiana Telecommunications Association, Lexington, Kentucky, June 2002.

"Broadband Deployment in the United States," Emerging Opportunities in Broadband Symposium, Northwestern University, Evanston, Illinois, December 2001.

"Local Competition in Illinois," Illinois Telecommunications Symposium, Northwestern University, Evanston, Illinois, December 2000.

"Licensing and Access to Innovations in Telecommunications and Information Services," Telecommunications Policy Research Conference, Alexandria, Virginia, September 2000.

"Effecting a Price Squeeze Through Bundled Pricing," Federal Communications Commission, Washington, D.C., May 1999.

"Competitive and Strategic Use of Optional Calling Plans and Volume Pricing Plans," The Institute for International Research Conference for Competitive Pricing of Telecommunications Services, Chicago, Illinois, July 1998.

"Effecting a Price Squeeze Through Bundled Pricing," Consortium for Research in Telecommunications Policy Conference, University of Michigan, Ann Arbor, Michigan, June 1998.

"The Pricing of Customer Access in Telecommunications," Conference on Public Policy and Corporate Strategy for the Information Economy, Evanston, Illinois, May 1996.

"Diversification as a Strategic Preemptive Weapon," University of Iowa, Iowa City, Iowa, February 1994.

"Diversification as a Strategic Preemptive Weapon, "University of Buffalo, Buffalo, New York, February 1994.

"Diversification as a Strategic Preemptive Weapon," University of Southern California, Los Angeles, California, December 1993.

"Strategic Pricing," Winter Meetings of the Econometric Society, Discussant, Anaheim, California, December 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Michigan State University, Lansing, Michigan, November 1993.

"Diversification as a Strategic Preemptive Weapon," Rutgers University, New Brunswick, New Jersey, November 1993.

"Diversification as a Strategic Preemptive Weapon," University of California at Santa Cruz, Santa Cruz, California, November 1993.

"Diversification as a Strategic Preemptive Weapon," Graduate School of Business, Stanford University, Stanford, California, November 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Purdue University, West Lafayette, Indiana, September 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Summer Meetings of the Econometric Society, Boston University, Boston, Massachusetts, June 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," University of California, Department of Economics, Berkeley, California, May 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Stanford University, Graduate School of Business, Stanford, California, May 1993.

"Diversification as a Strategic Preemptive Weapon," Stanford University, Graduate School of Business, Stanford, California, April 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Hoover Institution, Stanford, California, April 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," University of California, Graduate School of Business, Berkeley, California, February 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Stanford University, Department of Economics, Stanford, California, February 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Hoover Institution, Stanford, California, January 1993.

"Pricing Strategies," Session Discussant, 1992 North American Winter Meeting of The Econometric Society, Anaheim, California, January 1992.

"Diversification as a Strategic Preemptive Weapon," University of Toronto, Toronto, Canada, November 1991.

"Diversification as a Strategic Preemptive Weapon," Queen's University, Kingston, Ontario, Canada, November 1991.

"Bonuses and Penalties as Equilibrium Incentive Devices, with Application to Manufacturing Systems," University of Chicago, Chicago, Illinois, June 1991.

"The Timing of Entry into New Markets," Summer Meetings of the Econometric Society, University of Pennsylvania, Philadelphia, Pennsylvania, June 1991.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," University of Chicago, Chicago, Illinois, April 1991.

"Bonuses and Penalties as Equilibrium Incentive Devices, with Application to Manufacturing Systems," Winter Meetings of the Econometric Society, Washington, D.C., December 1990.

"Corporate Spin-offs in an Agency Framework," University of Washington, Seattle, Washington, October 1990.

"The Timing of Entry Into New Markets," University of British Columbia, Vancouver, British Columbia, October 1990.

"Corporate Spin-offs in an Agency Framework," Texas A&M University, College Station, Texas, April 1990.

"Firm Organization and the Economic Approach to Personnel Management," Winter Meetings of the American Economic Association, New York, New York, December 1989.

"Corporate Spin-offs in an Agency Framework," Western Finance Association Meetings, Seattle, Washington, June 1989.

"Corporate Spin-offs in an Agency Framework," University of Rochester, Rochester, New York, May 1989.

"Corporate Spin-offs in an Agency Framework," North American Summer Meetings of the Econometric Society, Minneapolis, Minnesota, June 1988.

"Competition, Relativism, and Market Choice," North American Summer Meetings of the Econometric Society, Berkeley, California, June 1987.

"Competition, Relativism, and Market Choice," University of Chicago, Chicago, Illinois, April 1987.

"Rate Reform and Competition in Electric Power," Discussant, Conference on Competitive Issues in Electric Power, Northwestern University, Evanston, Illinois, March 1987.

"Worker Reputation and Productivity Incentives," New Economics of Personnel Conference, Arizona State University, Tempe, Arizona, April 1986.

"Ability, Moral Hazard, and Firm Diversification," Various Universities, 1985, 1994, including Yale University, University of Rochester, Stanford University, University of Minnesota, California Institute of Technology, Duke University, Northwestern University, Brown University, Harvard University, University of California - Los Angeles, University of Pennsylvania.

ACADEMIC JOURNAL REFEREEING

Dr. Aron has served as a referee for *The Rand Journal of Economics, the Journal of Political Economy, the Journal of Finance, the American Economic Review, the Quarterly Journal of Economics, the Journal of Industrial Economics, the Journal of Economics and Business, the Journal of Economic Theory, the Journal of Labor Economics, the Review of Industrial Organization, the European Economic Review, the Journal of Economics and Management Strategy, the International Review of Economics and Business, the Quarterly Review of Economics and Business, Management Science, the Journal of Public Economics, the Journal of Institutional and Theoretical Economics*, and the National Science Foundation.

SELECTED TESTIMONY AND OTHER ENGAGEMENTS

Expert testimony before the New Jersey Board of Public Utilities regarding its review of telecommunications regulations and proposal to establish new regulations on incumbent and competitive wireline carriers, March 2007.

Analysis of damages in a matter pertaining to disputed access to landing rights and investment in submarine cable for transport of international data traffic, Ongoing 2007.

Expert testimony before the Michigan Public Service Commission regarding the competitive effects of total service resale of telecommunications services, and restrictions on resale pertaining to aggregation of demand for volume discounts, November 2006.

Preliminary Expert Report of Debra J. Aron, "The U.S. Long-haul Fiber Optic Network Industry: 1996-2001," in a matter involving disputed investment in long haul capacity in the U.S., June, 2006.

Expert testimony before the Kentucky Public Service Commission, Tennessee Regulatory Authority, and Mississippi Public Service Commission regarding the competitive effects of the proposed AT&T acquisition of BellSouth, June 2006.

Expert testimony before the state regulatory commission of California regarding the competitive landscape in California and the desirability of establishing a Uniform Regulatory Framework for the telecommunications industry in the state of California, February 2006.

Deposition testimony and trial testimony in the Court of Chancery in the state of Delaware In and For New Castle County and in Circuit Court of Cook County, Illinois County Department, Chancery Division, regarding the possibility of "irreparable harm" to Sprint Nextel's wireless affiliates in connection with Sprint's acquisition of Nextel Corporation, November 2005 – July 2006.

Expert testimony before the state regulatory commissions of California and Ohio evaluating the economic benefits and competitive impacts of the proposed acquisition of AT&T by SBC, June – August 2005.

Expert testimony before the Oklahoma Corporation Commission regarding the proper economic principles for reduced regulation of retail telecommunications services and regarding the determination of the amount of a supersedeas bond to quantify the economic harm likely to result from the award of a stay of Commission order that would grant pricing flexibility and require broadband investment, June – August 2005.

Expert testimony before the Kansas Corporation Commission regarding the sustainability of competition in Kansas, June 2005.

Cost and economic analysis for a large telecommunications firm regarding tariffed volume and term-discounted pricing plans for special access services based on regulatory requirements for consistency of prices with cost structure, March 2005.

Expert testimony before the Missouri Public Service Commission evaluating the potential competitive reclassification of local service in Missouri, January 2005.

Expert testimony before the state regulatory commissions of Ohio and Wisconsin regarding the effects of UNE pricing on the competitive telecommunications markets, July 2004.

Expert testimony before the Florida Public Utilities Commission and the Georgia Public Service Commission, written expert testimony before the public utilities commissions in Mississippi, Alabama, North Carolina, South Carolina, Tennessee, and Kentucky, and deposition testimony, regarding the proper principles for determining which network elements should be provided to competitors on an unbundled basis at regulated rates; including testimony in support of a business case model of the viability of efficient competitive entry in specific geographic markets in each aforementioned state, January-March 2004.

Ex parte presentation "The Economics of UNE Pricing," to the Federal Communications Commission staff, with William Rogerson, March 2004.

White Papers, "The Economics of UNE Pricing," December 2003, and "A Further Analysis of the Economics of UNE Pricing," January 2004, with William Rogerson, submitted to the Federal Communications Commission in FCC WC Docket No. 03-173: Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers.

White Paper, "The Effects Of Below-Cost TELRIC-Based UNE Prices On CLEC And ILEC Investment," submitted to the Federal Communications Commission in FCC WC Docket No. 03-173: Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, January 2004.

Expert testimony before the Illinois Public Utilities Commission regarding the proper determination of Total Element Long Run Incremental Cost (TELRIC) for establishing prices for network elements, March 2004.

Expert testimony before the Illinois General Assembly regarding the effects of current regulated UNE pricing of telecommunications elements on competitive telecommunications markets in Illinois, May 2003.

Expert testimony before the Pubic Utilities Commission of Ohio on issues related to rights-of-way fees charged to electric, water, and telecommunications companies in the City of Toledo, Ohio, March 2003.

Reports evaluating the cost impacts and public policy implications of the proposed California Consumer Protection rules on wireless carriers and customers, February 2003 and September 2003.

Expert testimony before the state regulatory commissions in Ohio, Illinois, Indiana, and Kansas on the economic principles for evaluating anticompetitive claims regarding "winback" pricing by incumbent telecommunications carriers, 2002 - 2003.

Report pertaining to the economic and antitrust analysis of price squeezes, and the suitability of imputation rules as a protection against an anticompetitive price squeeze, for a carrier in a foreign market, 2002.

Expert testimony before the Michigan Public Service Commission pertaining to allegations of anticompetitive effects of long term contracts, 2002.

For a small manufacturer of telecommunications equipment, consulting support to evaluate the antitrust implications of a proposed acquisition, 2002.

White Paper submitted to the Texas Public Service Commission pertaining to the competitive effects of "winback" and "retention" pricing, 2002.

In Order Instituting Rulemaking on the Commission's Own Motion to Assess and Revise the new Regulatory Framework for Pacific Bell and Verizon California Incorporated, written declaration submitted to the California Public Utilities Commission pertaining to the economic incentives created by modifications to the State's alternative regulation plan and competitive reclassification of services, 2002.

Statement to the Federal Communications Commission regarding the potential economic causes of sustained price increases for cable television services, 2002.

Expert testimony before the Kansas Corporation Commission regarding the antitrust principles relevant to establishing rules for competitive reclassification of services under governing state law, 2002.

For a national wireless telecommunications carrier, consulting support pertaining to litigation regarding access charges, 2001.

Expert testimony before the Missouri Public Service Commission pertaining to price squeeze allegations in the long-distance market, 2001.

Expert affidavit submitted to the Circuit Court in the state of Wisconsin, pertaining to irreparable harm caused if court declined to grant a stay of disputed performance remedy plan, 2001.

Expert testimony before the public utilities commissions of Illinois, Ohio, California, and Indiana, pertaining to the economic viability of constructing and provisioning ADSL services, including market definition and examination of competitive conditions, 2001.

Expert testimony before the Illinois Commerce Commission pertaining to the proper economic principles governing unbundling obligations, 2001.

In the matter of H & R Mason Contractor's et al. v. Motorola, Inc. et al., before the Circuit Court of Cook County, Illinois, expert affidavit examining the economic impediments to class certification, focusing on the determinants of price in the relevant equipment markets, April 2001.

For a competitive local exchange provider in a foreign market, consulting support regarding the proper determination of avoided costs for resale of incumbent services, April 2001.

For a major Japanese telecommunications equipment manufacturer, evaluated the revenue potential and desirability of entering several advanced services equipment markets worldwide, for the purposes of assisting the client to evaluate a proposed acquisition, February 2001.

Expert testimony in the Illinois Commerce Commission's Investigation Into Certain Payphone Issues, examined the economic and public policy issues pertaining to pricing of access lines for independent pay telephone providers, April 2001.

In the matter of the Illinois Public Utility Commission's Investigation Into Tariff Providing Unbundled Local Switching And Shared Transport, expert testimony regarding economic antitrust perspectives on obligations of firms to affirmatively help their competitors, and related public policy issues, April 2001.

In response to Request for Consultations by the U.S. Trade Representative (USTR) with the Government of Mexico before the World Trade Organization (WTO) regarding barriers to competition in Mexico's telecommunications market, analyzed regulated switched access rates in the U.S. in comparison with those charged by Telmex, November 2000.

Declaration submitted to the Texas Public Utility Commission, analyzed proposed regulation aimed at preventing incumbents from executing a price squeeze; developed a framework for evaluating claims of a price squeeze consistent with antitrust principles of predation, August 2000.

For a taxicab company, analysis of regulatory requirements in the City of Chicago pertaining to valuation of medallions and valuation of capital for purposes of regulatory ratemaking proceeding, 2000.

Written and oral testimony before the public utility commissions of Illinois and Michigan in various arbitration matters pertaining to the proper compensation for the use by competitors of client's facilities for foreign exchange services, 2000.

For a firm in the aluminum fabrication industry, in the matter of a potential merger between vertically integrated competitors, developed a methodology for adjusting the HHI measure of market concentration to account for the vertical control by the merging parties of downstream competitors, 2000.

For a large newspaper publisher, in the possible acquisition of the San Francisco Chronicle, analyzed the potential antitrust impediments to an acquisition by the client of the Chronicle, including issues of geographic and product market definition, the interplay between advertising markets and customer markets, and the relevant implications of the Newspaper Preservation Act, 1999.

Testimony before the Illinois Commerce Commission regarding the proper economic interpretation of the standards for declaring a service competitive under the Illinois Public Utilities Act, and quantification of the extent of competition in relevant Illinois markets, including discussion of market definition; the relevance of entry conditions; the relevance of resale competition and analysis of various resale entry strategies; the interdependence of resale and facilities-based entry strategies; and implementation of a technology-based method of measuring market participation, 1999-2000.

For a firm in the consumer mapmaking business, analyzed market definition, concentration, and efficiencies from a proposed merger, 1999.

Affidavit submitted jointly with Robert G. Harris to the Federal Communications Commission in the matter of "unbundled network elements" and commenting on the proper interpretation of the "Necessary and Impair" standard, including discussion of entry conditions and the business-case approach to valuation of an entry strategy, April 1999; reply affidavit May 1999.

Affidavit, "An Analysis of Market Power in the Provision of High-Capacity Access in the Chicago LATA," submitted to the Federal Communications Commission, including an analysis of the US DOJ merger guidelines and their applicability to regulatory relief in a regulated market, as well as extensive empirical modeling of the costs and business case for network buildout of high capacity facilities, February 1999.

White Paper, "Proper Recovery of Incremental Signaling System 7 (SS7) Costs for Local Number Portability," submitted to the Federal Communications Commission, April 1999.

PROFESSIONAL ORGANIZATIONS

Member, Telecommunications Policy Research Conference Program Committee

Member, American Economic Association

Member, Econometric Society

Associate Member, American Bar Association

PERSONAL INFORMATION

Born: March 15, 1957
Los Angeles, CA

CERTIFICATE OF SERVICE

I hereby certify that: I am over the age of eighteen years and not a party to the within entitled action; my business address is 711 Van Ness Ave., Ste. 300, San Francisco, CA 94102; I have this day served a copy of the foregoing:

DECLARATION OF DR. DEBRA J. ARON SUPPORTING OPENING COMMENTS OF VERIZON CALIFORNIA INC. AND ITS CERTIFICATED CALIFORNIA AFFILIATES

by electronic mail to those parties on the service list shown below who have supplied an e-mail address, and by U.S. mail to all other parties on the service list.

I declare under penalty of perjury that the foregoing is true and correct. Executed this 14th day of May, 2007, at San Francisco, California.

/s/Sonja Killingsworth
SONJA KILLINGSWORTH

Service List:
R.02-12-004

CALIFORNIA PUBLIC UTILITIES COMMISSION
Service Lists

Proceeding: R0212004 - PUC - SERVICE QUALIT
Filer: PUC
List Name: INITIAL LIST
Last changed: April 17, 2007

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Appearance

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